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(54) Mouthpiece for a drinking vessel.

(57) A tubular mouthpiece 1 for a drinking vessel, comprises a normally closed valve 9 which is operated by the mouth of the drinker and which is adapted to be connected to the drinking vessel whereby when the mouthpiece 1 is connected to a drinking vessel containing a drinking liquid only when the valve 9 is operated by the mouth of the drinker does the valve 9 open and the liquid flow from the drinking vessel, through the mouthpiece and into the drinker's mouth and when mouth operated is stopped, the flow of the liquid from the drinking vessel ceases.

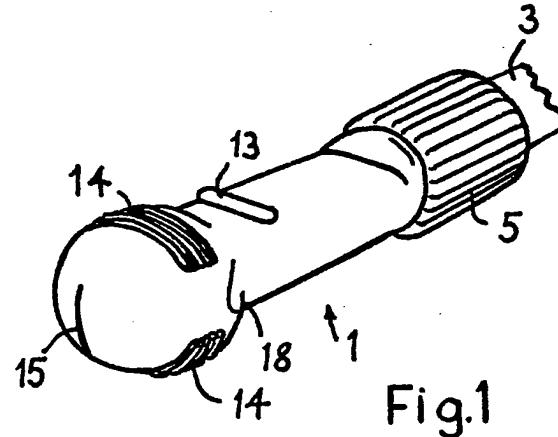


Fig.1

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"MOUTHPIECE FOR A DRINKING VESSEL"

This invention relates to mouthpieces for drinking vessels and to drinking tubes, drinking straws and drinking vessels incorporating such mouthpieces.

Drinking vessels having a drinking tube through which liquid may be sucked from a liquid reservoir in the vessel are known and have conventionally been used in activities such as athletics and cycling where it is desired that the drink be protected against spillage and be constantly available, preferably without the drinker needing to employ either hand. Such drinking vessels are also known for use by invalids, e.g. as disclosed in U.S. Patent Specification No. 4,196,747 where there is a valve disposed in a drinking tube within the drinking vessel and in which liquid can syphon from the vessel if the outlet from the tube is left at a lower level than the level of liquid within the vessel after drinking has been stopped. Also, another known drinking vessel is disclosed in U.S. Patent Specification No. 4,016,998 having an integral drinking tube with a valve in an overflow channel.

None of the previously known drinking vessels are suitable for use in circumstances in which the vessel is likely to be laid on its side or inverted and can come into contact with unpleasant contaminants such as sea water such as those encountered by the armed forces where the drinking liquid may be contaminated by dust, dirt and sand. In particular, in the popular sport of wind surfing, it would be highly advantageous to have a suitable drinking vessel available from which a drink could be taken whilst enjoying the sport. Since wind surfers frequently fall into the water, the contents of conventional drinking vessels of this general type would become contaminated with sea water. Also, the drinking vessel would be likely to spend considerable periods of time in a position other than an upright position and accordingly there would be a substantial danger of the contents being lost, e.g. through siphoning through the outlet tube.

Similar problems are likely to be experienced in other activities.

Furthermore, with such known drinking vessels, difficulties in operation by a drinker can be experienced because the operating valve is remote from the mouthpiece.

Accordingly, the main object of the present invention is to provide a mouthpiece for a drinking tube or drinking vessel or drinking tube or drinking vessel having a mouthpiece in which the aforesaid disadvantages are minimized or eliminated.

To this end the present invention consists in a tubular mouthpiece for a drinking vessel, said mouthpiece comprising a normally closed valve which is operated by the mouth of the drinker and which is adapted to be connected to a reservoir for containing a liquid for drinking whereby when the mouthpiece is connected to a drinking vessel containing the drinking liquid only when the valve is operated by the mouth of the drinker does the valve open and the liquid flow from the reservoir, through the mouthpiece and into the drinker's mouth and when mouth operation is stopped, the flow of the liquid from the reservoir ceases.

By having the valve in the mouthpiece, not only is the drinking liquid in the reservoir prevented from being spilt but any contamination of the drinking liquid in the reservoir with foreign matter such as sea water from the external environment is substantially prevented by the closure of the valve.

The mouthpiece may be adapted to be connected to the drinking vessel in any convenient manner, e.g. by means of a drinking tube. Thus, the mouthpiece may have a stem which is connected to a drinking tube, having a length sufficient to extend from outside the reservoir to adjacent the bottom of the reservoir, by fitting the stem with a friction fit onto or into the exposed free end portion of the tube.

The valve may be disposed within a valve chamber defined by the inner wall of the mouthpiece and having an inlet for drinking liquid from the reservoir and an oppositely facing outlet for the drinking liquid from the mouthpiece.

In one embodiment of the invention the valve has a seat surrounding the liquid inlet, a valve member, a means such as a compression spring urging the valve member against the valve seat to close the valve yet being suitable to be overcome by a mouth operation involving suction applied by the mouth to the mouthpiece.

Whilst in this embodiment the mouthpiece is useful in many situations, the valve chamber is still open to the external environment through the drinking liquid outlet. Therefore in wind surfing and sailing and in conditions encountered in the field by the armed forces, e.g. by the army, in the desert, there is a need to provide a mouthpiece which is completely closed against the external environment. In such harsher conditions, contaminants such as dust and sea water can enter through the drinking liquid outlet in the valve chamber and remain there to pollute the drinking liquid en route through the valve chamber to the mouth and in the reservoir by passing back during closure of the

valve. Moreover, if the valve chamber does get contaminated, it can be very difficult to completely clean the valve chamber and remove the taste of the contaminants therefrom.

Furthermore, the spring pressure can weaken with use and with it-being subjected to contaminants in harsh environments so that there is a need in certain situations for the valve to have a more positive action.

Accordingly, in a preferred embodiment, in which the mouthpiece has an inlet for a drinking liquid from the reservoir and an outlet for drinking liquid from the mouthpiece both the inlet and the outlet are normally closed and are opened by a mouth operation which involves a biting action of the mouth of a drinker. Thus, when such a mouthpiece is connected to the drinking liquid reservoir, the mouthpiece and the reservoir form a completely closed circuit, which prevents the entry of any foreign contaminants into the interior of the mouthpiece and into the reservoir. The biting action may be performed with the lips, teeth or gums.

Moreover, such a mouthpiece has the advantages of, one completely handed operation, no undoing or doing up of tops, immediate reseal when the biting action is stopped, without needing to use either hand, so not only is contamination avoided but use with carbonated drinks is possible since gas escape is prevented once sealed, there is no spillage e.g. when knocked over or by any dripping or leakage even when sealed from the valve chamber, because of the immediate sealing action, there is no syphoning action which can occur with prior art drinking vessels in which the normally closed valve is in a drinking tube within the reservoir, can be adapted to suit any kind of drinking reservoir, whatever the kind of closure or opening, e.g. keyhole opening type cans and can be developed as a modular system, e.g. a particular mouthpiece can be adapted to suit a wide variety of different vessels and can not only be arranged to suit any environment but also geared towards the particular activity involved.

It should be appreciated that the mouthpiece may be adapted to be directly connected to the drinking liquid reservoir, e.g. by an internal or external thread engaging with a corresponding external or internal thread on the reservoir or the key-hole type slot in the top of an open drink container e.g. by a turning and clamping action, or connected indirectly to the reservoir by means of a drinking tube such as previously described.

The mouthpiece is conveniently made of a resilient or flexible material and the outlet in its closed position in the form of a slit in the mouth engaging end, the sides of which are pressed firmly against each other to prevent the flow of liquid therethrough. When the mouthpiece is bitten

with the slit in a position extending transversely of the drinker's mouth, the slit opens to form an open outlet of generally circular configuration and at the same time the bite causes the valve in the valve chamber to open to free the inlet so that when the mouthpiece is sucked liquid will flow from a drinking vessel to which the mouthpiece is connected through the mouthpiece and into the drinker's mouth. So long as the bite is maintained and suction applied the liquid will flow from the mouthpiece. However, immediately the bite is released both the inlet and outlet will close.

The inlet valve is advantageously in the form of two flaps which pivot intermediate their ends such that the distal ends of the flaps abut each other in the closed position and the proximal ends of the flaps are spaced apart whereby pressure on the mouthpiece by a biting action will cause the proximal ends to abut each other and the distal ends to move apart, about the pivot to open the inlet. Immediately, the biting pressure is released the proximal ends move apart and the distal ends move into abutment to close the inlet.

The invention also consists in a drinking tube or straw having any of the mouthpieces defined hereinabove connected thereto.

A non-return valve may be positioned in the tube, preferably at or near the end thereof adjacent the bottom end of the reservoir, adapted to prevent back flow of liquid out of the tube into the reservoir.

Advantageously, the drinking vessel itself is of plastics material and preferably of an insulating construction. For instance, the vessel may comprise a layer of foam to provide insulation. Suitably, the vessel is of self skinning plastics foam.

Preferably, the vessel is formed with a narrowed waist portion for firm location of attachment means for mounting the vessel in position in use as will be described hereafter.

Preferably, the tube is a flexible tube such as a flexible plastics tube. This suitably passes through a detachable end cap for the drinking vessel.

Means is preferably provided by way of an air bleed through the cap for allowing air into the drinking vessel to replace liquid as it is drunk.

The drinking vessel may be provided with a strap member for attaching to a support such as the mast of a wind surfer or to a wearers arm, for example comprising a first strap portion for passing around the container, means for connecting opposed parts of the first strap portion to trap the container, a second strap portion for passing around a support and means such as VELCRO (Trade Mark) for connecting opposed parts of the second strap portion to attach the strap member to the support, said first and second strap portions being joined to one another in a region intermediate their respective opposed parts.

In order to assist in preventing slippage of the strap member on the support in use, a strip or patch of gripping material such as a soft natural or synthetic rubber may be provided on that face of a part of the second strap portion which will engage a support in use.

In a preferred embodiment, a ring or loop member is provided on one end of the second strap portion through which the first strap portion may be passed with, optionally, co-operating connecting means provided on an outer face of the second strap portion adjacent its other end from said loop or ring and an outer face of the first strap portion whereby said other end of the second strap portion may be passed through the loop or ring and returned over itself to overlay the connecting means provided on the outer surface of the first strap portion and to connect thereto.

The present invention further consists in a drinking vessel provided with any of the mouthpieces defined hereinbefore connected thereto.

In order that the invention may be more fully understood some embodiments in accordance therewith will now be described, by way of example, with reference to the accompanying drawings, in which:-

Figs. 1, 2 and 3 are perspective, longitudinal sectional and end views respectively of a mouthpiece made in accordance with the present invention, with the liquid inlet and outlet in their closed positions.

Figs. 4, 5 and 6 are similar views to those of Figs. 1 to 3, with the liquid inlet and outlets in their open positions;

Figs. 7, 8 and 9 are a front elevation, top plan view and perspective view respectively of one embodiment of drinking flask including the mouthpiece of Figs. 1 to 6;

Fig. 10 is a perspective view of another embodiment of drinking flask,

Figs. 11 and 12 are perspective views of the drinking flask of Figs. 7 to 9 fitted with alternative carrying means.

Fig. 13 is a perspective view of another embodiment of a drinking vessel,

Fig. 14 is a cut-away side elevation of a drinking bottle having an alternative mouthpiece with a different form of valve,

Figs. 15A and 15B are enlarged sectional views of the mouthpiece illustrated in Fig. 14 with the valve in the closed and open positions respectively, and

Fig. 16 is an edge view of a strap member used in conjunction with the drinking vessel of Fig. 14.

Referring to Figs. 1 to 6 of the drawings, there is shown a mouthpiece which is generally indicated at 1 and which is made of a flexible, resilient material such as natural or synthetic rubber or a suitable plastics. The mouthpiece 1 has a stem 2 which, in the illustrated embodiment, is fitted into one end portion of a drinking tube 3, with the stem 2 and end portion 3 being of complimentary shape to provide a positive fit and with the stem 2 being provided with a shoulder 4 which acts as a stop and abuts against the end of the tube 3. To ensure a liquid tight fit with the tube 3 the joint between the tube and the stem 4 is covered by a sleeve 5.

The mouthpiece 1 has a free end portion 6 which is of generally circular cross-section, the more easily to facilitate holding of the mouthpiece in a drinker's mouth during use. A valve chamber 7 is defined by the inner wall 8 of the mouthpiece 1 with a valve 9 comprises two flaps 10 which are pivoted by means of an interengaging ridge and recess at a location 11 intermediate their ends, with the valve 9 being located in the drinking liquid inlet 12 by means of ridges on the flaps 10 engaging in complimentary recesses in the inner wall 8 of the mouthpiece 1. The construction of the mouthpiece is such that the recesses in the inner wall 8 provide external ridges 13 for a purpose to be described.

The external wall of the mouthpiece end portion 6 is provided with oppositely facing bands of serrations 14 to facilitate holding in the mouth and with a slit 15 which forms the outlet for drinking liquid from the mouthpiece when open as illustrated in Fig. 4. Thus, it will be seen, that the mouthpiece terminates in a blind end so that when the mouthpiece is connected to a drinking vessel such as the drinking flask 16 shown in Figs. 7 to 8, with the drinking flask having been previously charged with liquid, the drinking liquid is contained all within one boundary. Also, as the mouthpiece terminates in a blind end, because of the slit 15, the mouthpiece is easy to clean.

As can be seen from Figs. 7 to 9, the mouthpiece 1 with tube 3 (not visible) extending therefrom is mounted within an aperture in the screw threaded top 17 of the drinking flask 16 in such manner as to be sealed with respect to the top 17, for example using the sleeve 5 with a friction fit. When it is desired to recharge the flask with drinking liquid, it is a simple matter of unscrewing the top 17.

In order to have a drink from the flask 16, incorporating the mouthpiece 1, the end portion 6 of the mouthpiece is placed in the mouth and the teeth located between the ridge 13 and the neck 18 of the end portion 6 with the slit 15 extending transversely of the mouth. The mouthpiece is then bitten by the teeth and/or pressure by lips causing the proximal ends of the flaps 10 of the valve 9 to

move towards each other and the distal ends of the flaps 10 to move away from each other and into the position shown in Fig. 5 and to cause the slit to open into the aperture shown in Figs. 4 and 6 so that both the inlet and the outlet of the mouthpiece are open to the drinking liquid in the reservoir constituted by the flask 16. When suction is applied by the mouth liquid flows into the tube 3 through the inlet into the chamber 7 and out through the open outlet 15 and into the mouth. As soon as the biting action is stopped, both the valve 9 and the slit valve 15 close so that the drinking liquid is, again, enclosed all within one boundary to protect the interior of the mouthpiece and the flask 16 from any contamination from the external environment. If desired, the liquid can remain within the tube 3 by applying suction until the valves 9 and 15 are closed so as to obtain a ready drink without needing to charge the tube 3 first with liquid, for example in hazardous conditions such as sailing in rough seas, or, alternatively, by stopping suction and maintaining the biting action, the liquid 3 may be allowed to drain out of the tube and back into the reservoir in the flask 16.

If it is desired, for certain conditions, that the tube 3 and the mouthpiece 1 shall remain charged with liquid without any further thought, then a non-returning valve can be incorporated in the end of the drinking tube 3 adjacent the bottom of the reservoir in the flask 16, as described in the specification in the aforementioned patent application.

In the embodiment of Fig. 10, the drinking tube 3 is extended out through the cover 17 of the flask 16 (which is of smaller size) and the mouthpiece is fitted to the end of the tube 3 outside the flask to provide a flask with a drinking straw.

Figs. 11 and 12 show different ways of carrying the flask. In Fig. 11 a carrying handle 19 is fitted to the screw-threaded spigot projecting from the flask 16 and is held in position by screwing the cover 17 onto the screw-threaded spigot.

On the other hand, the flask 16 in Fig. 12 is provided with a strap 20 which is connected to the flask 16 through a slot 21 formed into the flask during moulding.

In the embodiment of Fig. 13, the mouthpiece 1, either with or without a drinking tube 3 attached thereto is fitted into the keyhole slot (not shown) of a drinking vessel constituted by a carbonated drinks container 16a by means of a fitting and clamping member 22. Of course, the drinking liquid within the can may not necessarily be carbonated.

Whilst the embodiment of mouthpiece illustrated in Figs. 1 to 6 when used with any of the illustrated drinking vessels provides a completely closed circuit which prevents the entry of any foreign contaminants under most hazardous conditions the embodiment illustrated in Fig. 14 is still suitable for less hazardous conditions.

Referring to Figure 14, the drinking bottle 31 is provided, midway along its length, with a reduced diameter waist 32. The bottle 31 has a screw cap 33 including a larger central bore through which passes a flexible drinking tube 34 and a smaller bore 35 which acts as a bleed channel for air entering the bottle. Bore 35 is sufficiently small that liquid cannot spill through it.

At its lower end drinking tube 34 carries, optionally, a non-return valve 36 of simple design comprising a tubular casing having an opening at each end and a perforated partition wall 37 adjacent one end. Trapped between the partition wall 37 and an inwardly projecting lip at the end of the valve 36 is a flap member 38 which can seal against the lip 38a to prevent passage of liquid out of the tube into the bottle but upon suction being applied to the tube is carried back to lie against the partition 37 against which it will not seal.

At the exterior end of the tube 34 there is fitted a spherical mouthpiece 39 which is illustrated in detail in Figures 15A and 15B. As shown in Figure 15A, the mouthpiece 39 has a valve having a valve casing in two parts of plastics material. Together, the two parts of the casing form the spherical mouthpiece 39 which has a tubular tail 40 leading into the hollow interior of the valve casing. The tail 40 is provided with forwardly tapering annular ribs 41 for tight location of the mouthpiece in the tube 34.

The two parts of the casing are assembled together as a press fit and are locked together by an annular snap fitting formation 42.

Within the hollow interior, which constitutes a valve chamber, of the valve there is provided an annular valve seat 43 surrounding the inlet of the mouthpiece and an elastomeric valve element 44 in the form of a disk having on its downstream face a boss 45 of reduced diameter over which is received one end of a frusto-conical coil compression spring 46, the larger end of which seats against a shoulder provided on the interior of the casing.

Four end stop fingers 47 are provided at the outlet of the mouthpiece projecting inwardly as seen in Figure 15B. When a mouth operation involving suction is applied to the mouthpiece, the valve 44 is carried away from the valve seat 43 to abut against the end stop fingers 47. Upon cessation of the suction, the coil spring 46 returns the valve element to close the valve seat 43 and thus the inlet.

For attachment to a support such as the mast of a wind surfer, the drinking bottle of Figure 14 may be provided in conjunction with a strap member as shown in Figure 16. The strap member of Figure 16 comprises a first strap portion 48 on a second strap portion 49, for instance of webbing material. The first and second portions are attached over a central region 50, e.g. by stitching. A first Velcro (Trade Mark) connector patch 51 is sewn to the outer surface of an end area of the first portion 48. A co-operating patch 52 of Velcro (Trade Mark) of the opposite type is provided on the interior face of an area at the opposite end of the first portion 48 which can overlay and attach to the patch 51. The waist 2 of the bottle is receivable in the loop of webbing so formed by the first portion.

The second portion 49 is intended to pass around a support such as a wearer's arm or the mast of a wind surfer and comprises a first arm 53 having on an interior face thereof patch 54 of elastomeric, non-slip material intended to prevent slippage of the strap member on the support. This is suitably formed of a natural or synthetic rubber material such as neoprene. At its end, the first arm 53 bears a D-ring 55. A second arm 56 of the second portion 49 is passed through the D-ring 55 and is returned over itself toward the first portion 48 of the strap member. In an end area of the second arm 56 there is provided a Velcro (Trade Mark) patch 57. A Velcro (Trade Mark) patch 58 of an opposite type to patch 57 is provided on the first portion of the strap member on the other side of the webbing from patch 52.

The second portion of the strap member may therefore be tensioned around a support and anchored by engagement of the Velcro patches 57 and 58. The bottle may be removed from the strap member by opening the connection between Velcro patches 51 and 52 without disturbing the attachment of the strap member to the support.

Because of the provision of the valved mouthpiece and because of the shapes selected for the mouthpiece, the drinking vessels described may be immersed in sea water in any attitude and upon being righted and removed from the water will enable the user to drink from the vessel without the contents of the bottle or the first portion of drink dispensed from the tube being contaminated to any significant extent by sea water. Furthermore, because of the provision of the mouthpiece valve, the tube remains full of liquid in use. This means that the tubes can be of considerable length without the user having to suck liquid all the way through the tube at each occasion the drink is wanted. The vessels may therefore be placed some way from the users normal position and the tubes may be conveyed to a location nearer to the

users mouths. For instance, the vessel may be strapped to the mast of a wind surfer and the tube may be carried along a boom associated with the wind surfer's sail.

5 Alternatively, the vessel may be fixed in other locations such as on a user's arm or on a pack carried on a user's back and the tube may be conducted to a location adjacent the user's mouth. The tube may be clipped in position in use, and for 10 this purpose suitable means for clipping the tube in position may be provided.

One or more clips or pockets may be associated with the strap member for holding the tube in a storage position and/or for receiving items of 15 use such as keys and small tools.

The drinking vessels described in Figs. 7 to 12 and Fig. 14 may be made of any suitable material but are preferably formed of self-skiving plastics foam which provides the vessels with heat insulation properties.

20 Although the invention has been described with reference to particular embodiments thereof, it should be appreciated that various modifications may be made without departing from the scope of 25 the invention. For example, in the embodiments of Figs. 7 to 11 the drinking tube 3 may be provided with a non-return valve but this is not essential in these embodiments or the embodiment of Fig. 14.

30 Claims

35 1. A tubular mouthpiece for a drinking vessel, said mouthpiece comprising a normally closed valve which is operated by the mouth of the drinker and which is adapted to be connected to a drinking vessel for containing a liquid for drinking, whereby when the mouthpiece is connected to the drinking vessel, only when the valve is operated by the 40 mouth of the drinker does the valve open and the liquid flow from the vessel, through the mouthpiece and into the drinker's mouth and when mouth operation is stopped, the flow of the liquid from the drinking vessel ceases.

45 2. A mouthpiece as claimed in claim 1, characterized by being connectable to the drinking vessel by means of a member which engages in a hole in the drinking vessel or by means of a cap or top therefor.

50 3. A mouthpiece as claimed in claim 1 or 2, characterised by having a drinking tube for communicating the mouthpiece with a drinking liquid reservoir in the drinking vessel and such that the free end of the tube is disposed adjacent the bottom of the reservoir.

55 4. A mouthpiece as claimed in claim 3, characterized in that the mouthpiece has a stem which is integral with the drinking tube or to which the

other end of the tube is connected by fitting the stem with a friction fit onto or into the exposed free end portion of the tube.

5. A mouthpiece as claimed in any one of claims 1 to 4, characterized in that the valve is disposed within a valve chamber defined by the inner wall of the mouthpiece and having an inlet for drinking liquid from the drinking vessel and an oppositely facing outlet for the drinking liquid from the mouthpiece with the valve normally closing the inlet.

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6. A mouthpiece as claimed in claim 5, characterized in that the valve comprises a valve seat surrounding the liquid inlet, a valve member, a means such as a compression spring urging the valve member against the valve seat to close the valve yet being suitable to be overcome by a mouth operation involving suction applied by the mouth to the mouthpiece.

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7. A mouthpiece as claimed in claim 5, characterized in that both the inlet and the outlet are normally closed and are opened by a mouth operation which involves a biting action of the mouth of a drinker.

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8. A mouthpiece as claimed in claim 5 or 7, characterized by being made of a resilient or flexible material with the outlet in its closed position being in the form of a slit in the mouth engaging end, and with the sides of the slit being pressed firmly against each other to prevent the flow of liquid therethrough, whereby when the mouthpiece is bitten with the slit in a position extending transversely of the drinker's mouth, the slit opens to form an open outlet, the valve in the valve chamber is opened to free the inlet so that when the mouthpiece is sucked liquid will flow from a drinking vessel to which the mouthpiece is connected through the mouthpiece and into the drinker's mouth so long as the bite is maintained and suction applied and will stop immediately the bite is released whereupon both the inlet and outlet will close.

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9. A mouthpiece as claimed in claim 8, characterized in that the inlet valve is in the form of two flaps which pivot intermediate their ends such that the distal ends of the flaps abut each other in the closed position and the proximal ends of the flaps are spaced apart whereby pressure on the mouthpiece by the biting action will cause the proximal ends to abut each other and the distal ends to move apart, about the pivot to open the inlet and immediately, the biting pressure is released the proximal ends move apart and the distal ends move into abutment to close the inlet.

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10. A drinking tube having a mouthpiece as claimed in any preceding claim.

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11. A drinking vessel including a mouthpiece as claimed in any one of claims 1 to 9.

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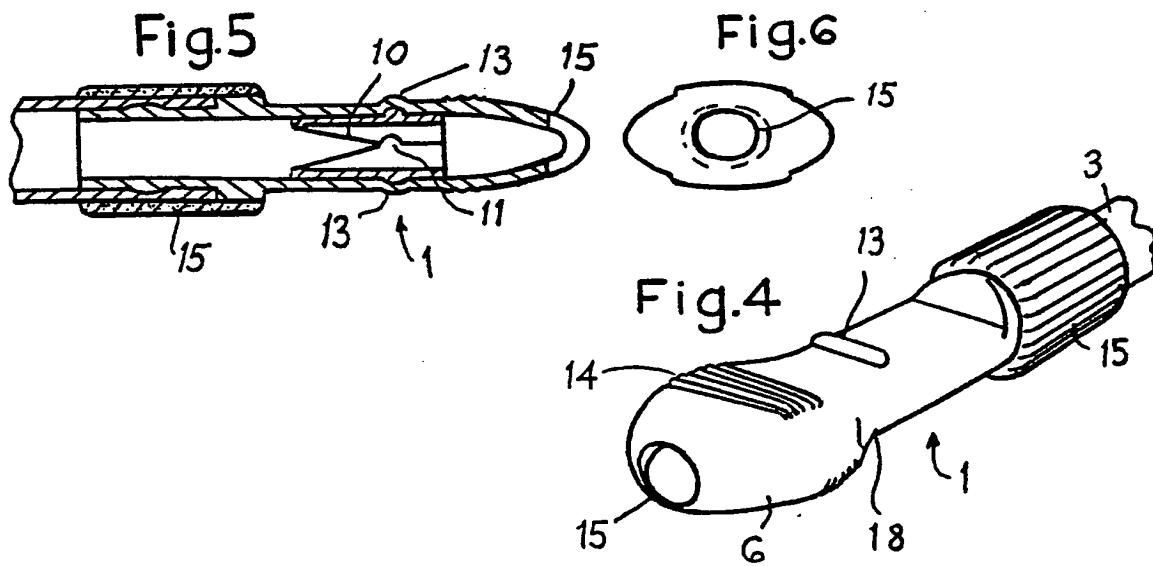
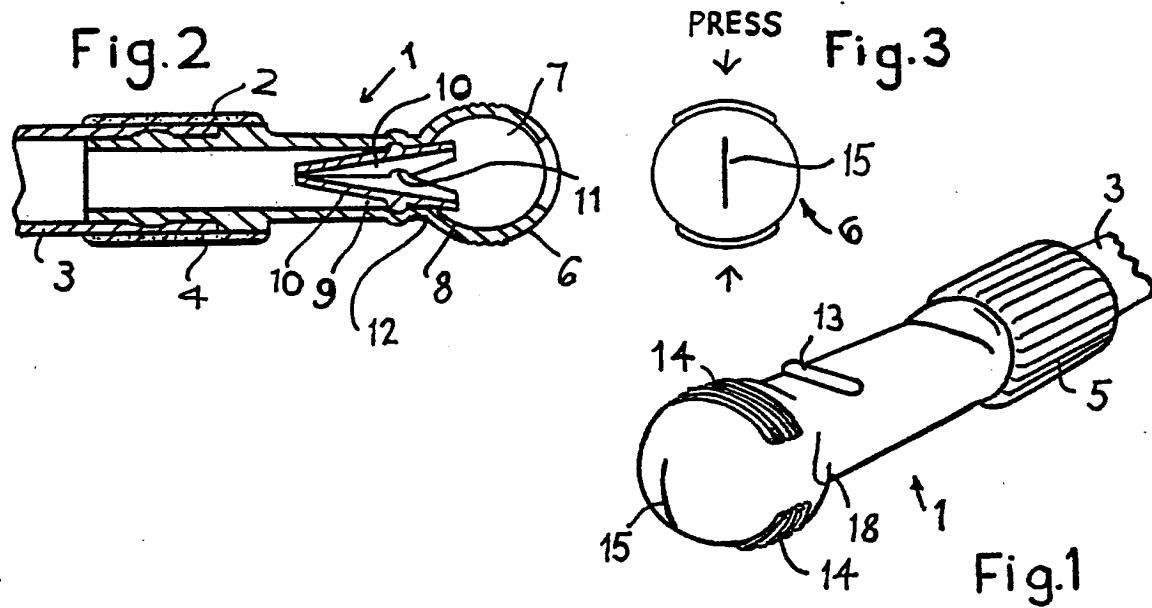
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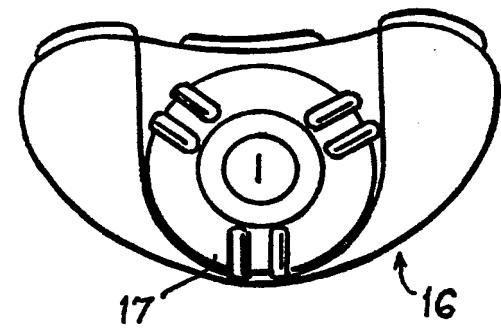
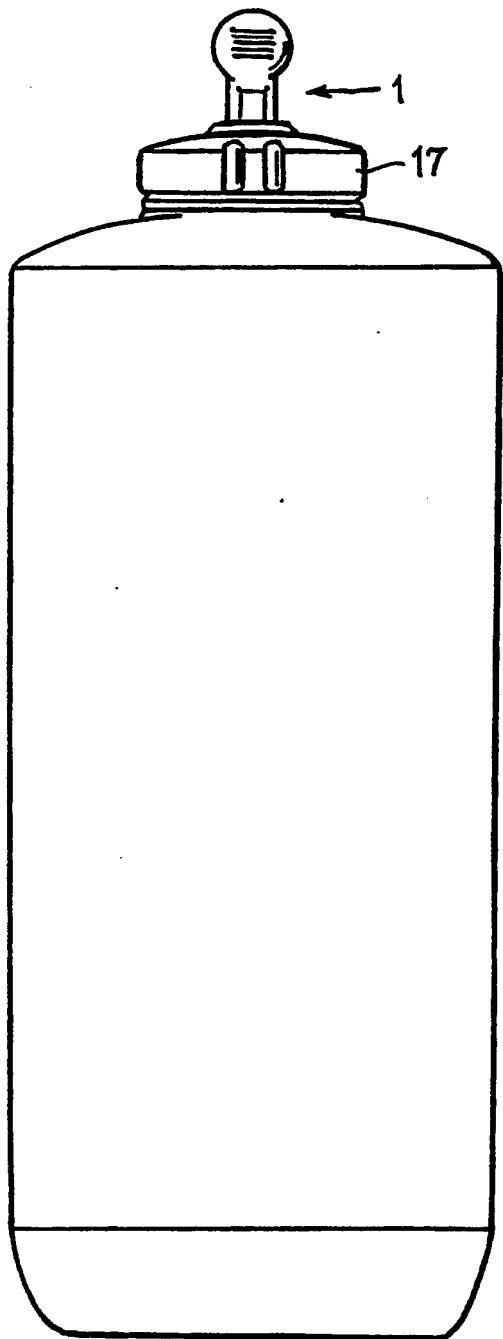
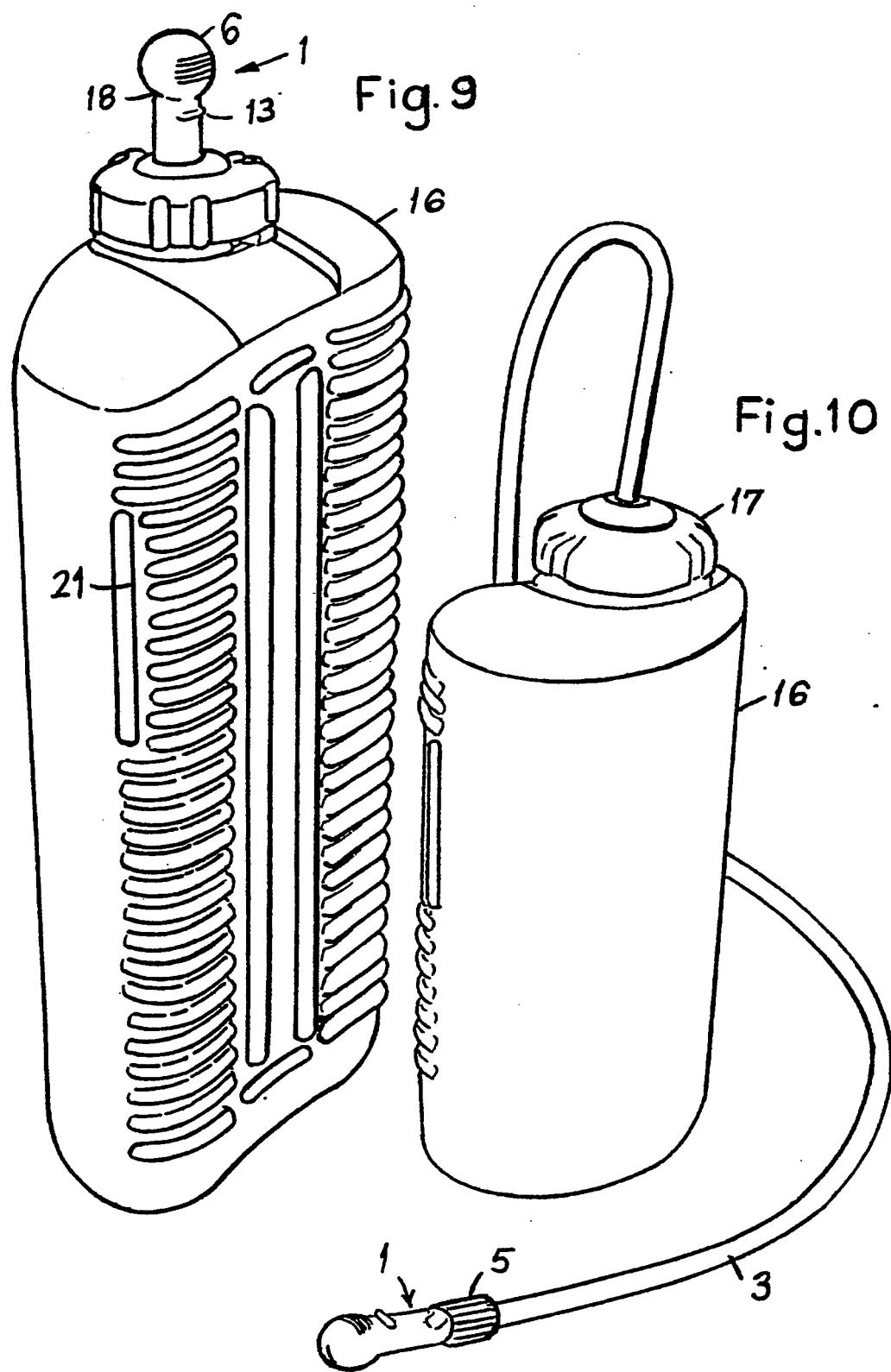


Fig. 8

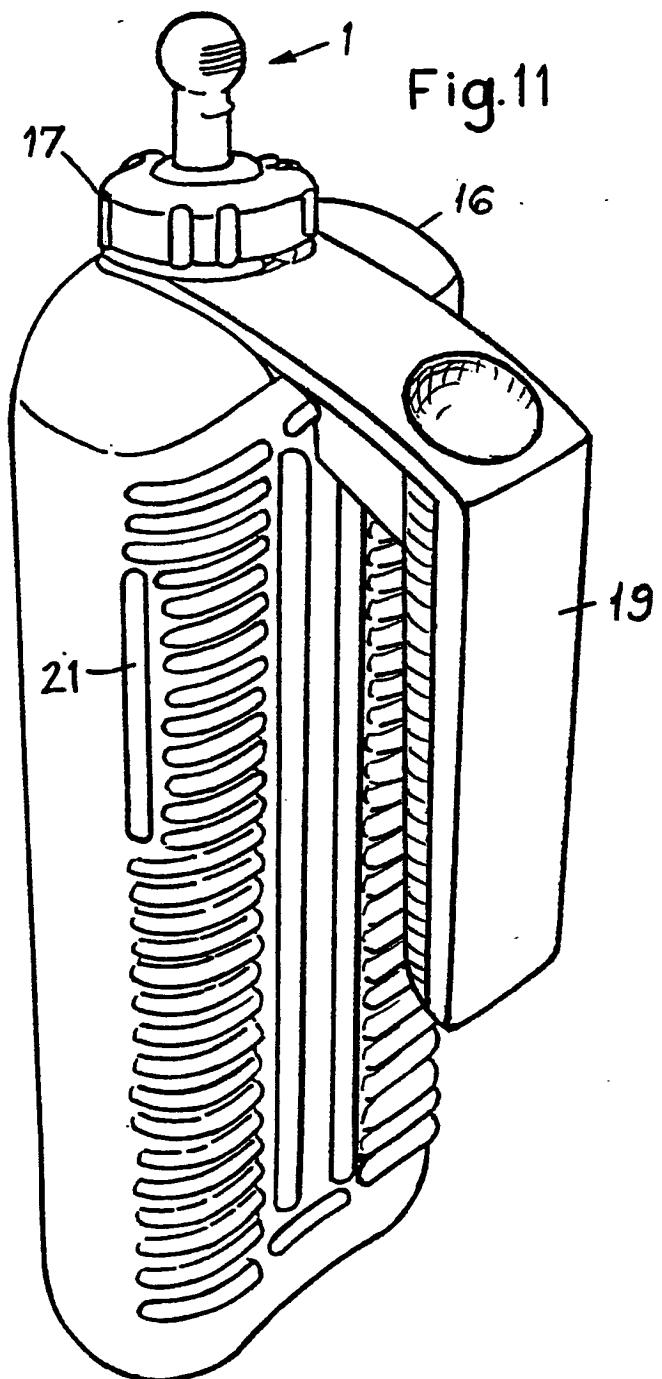
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Fig. 7

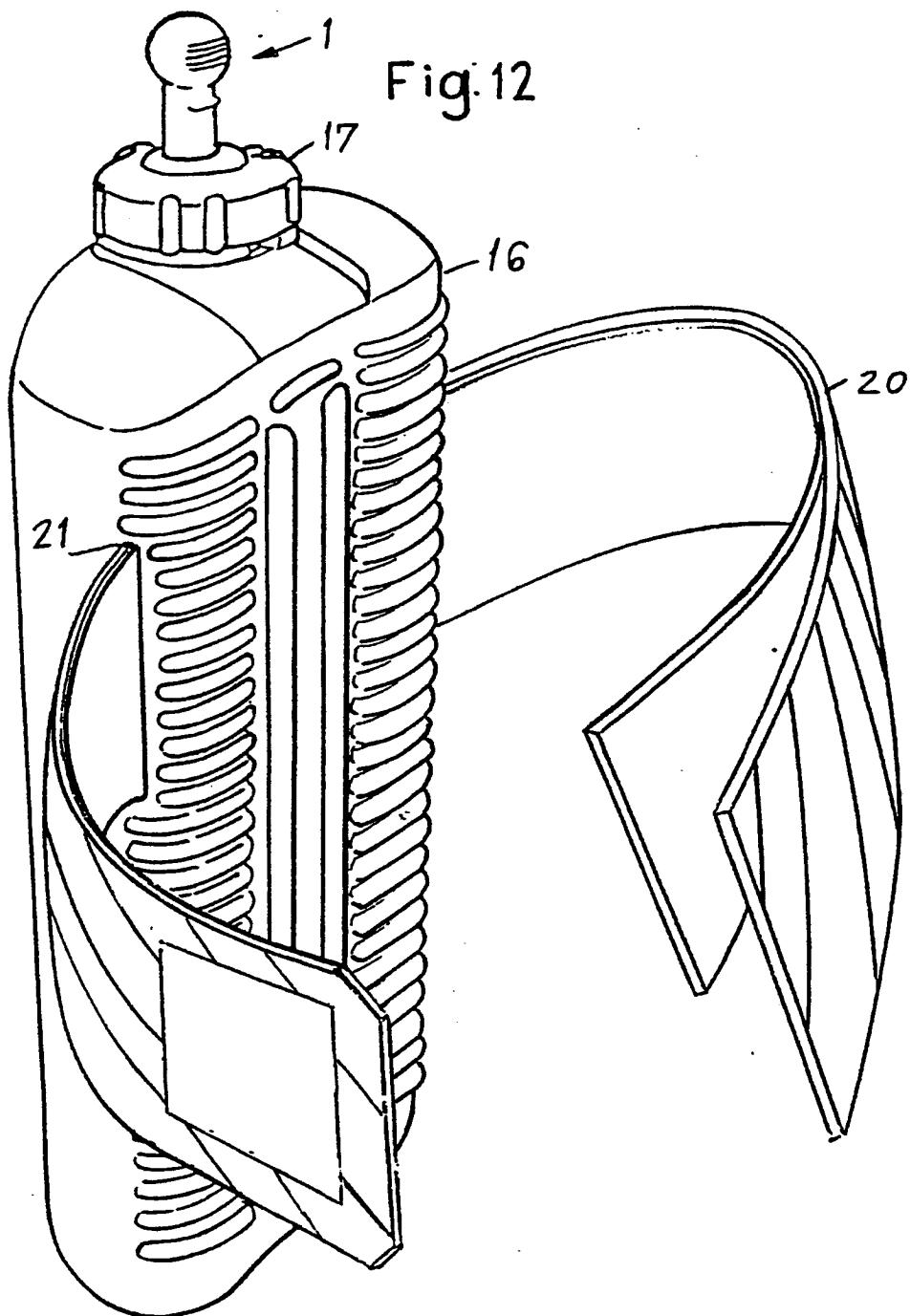
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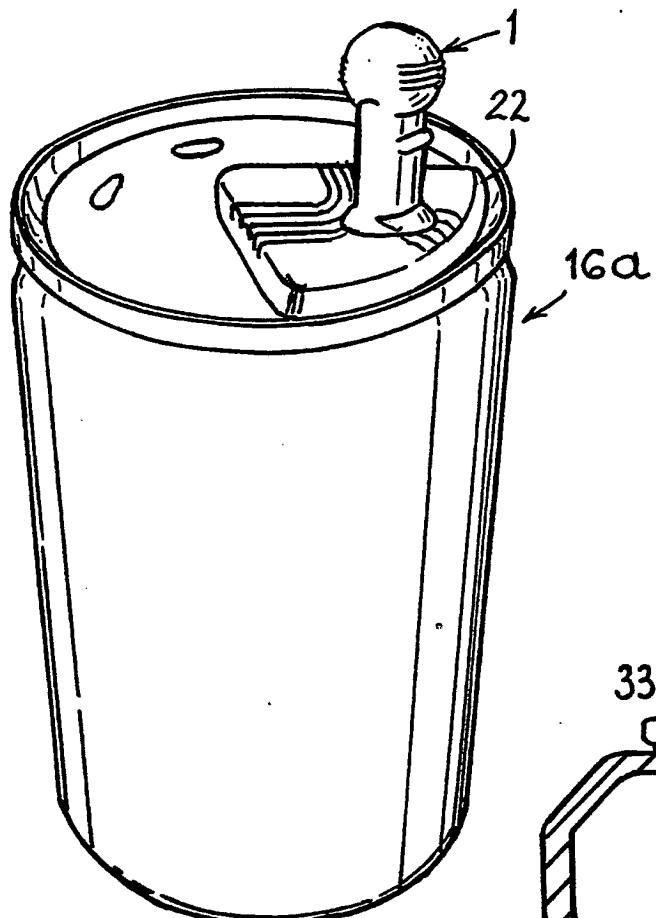


Fig. 13

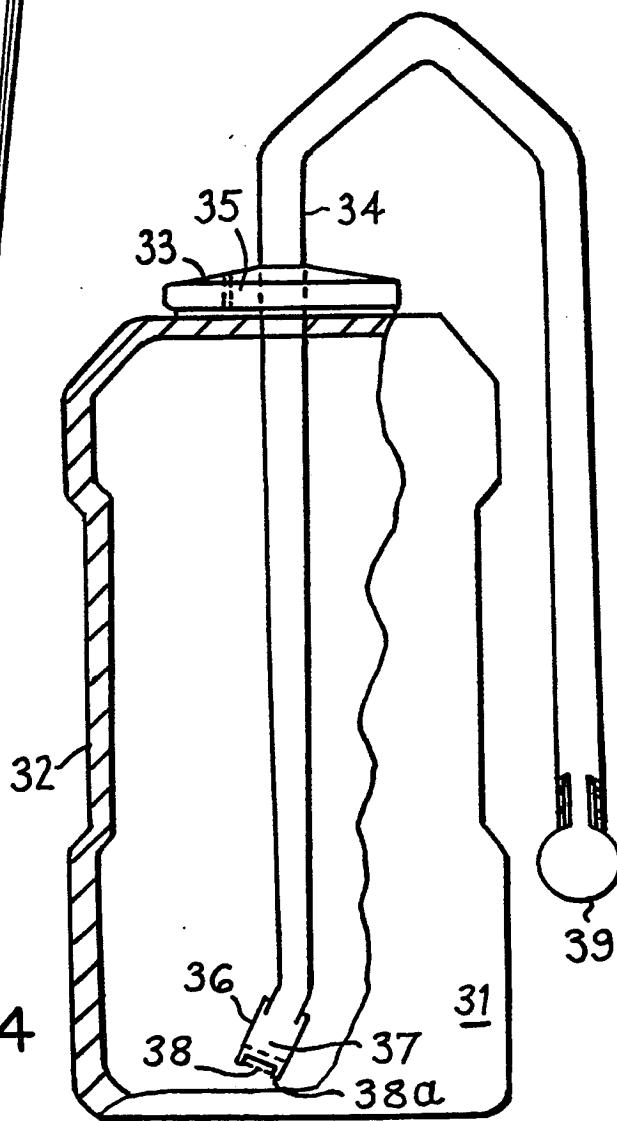


Fig. 14

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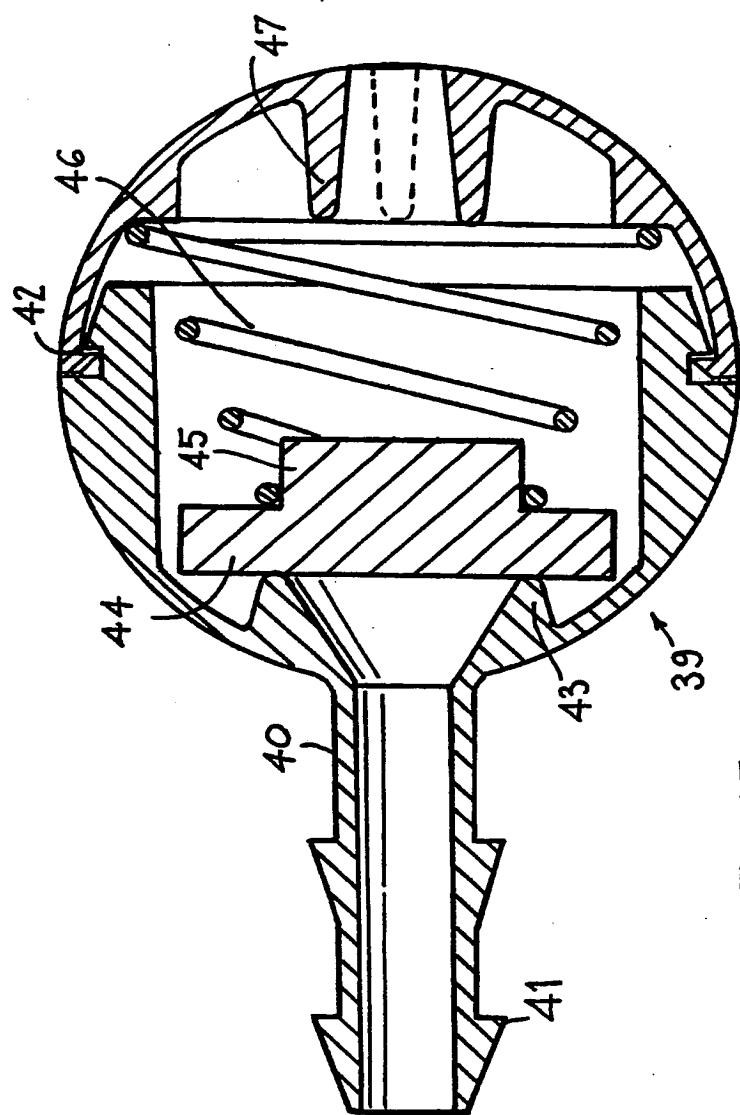
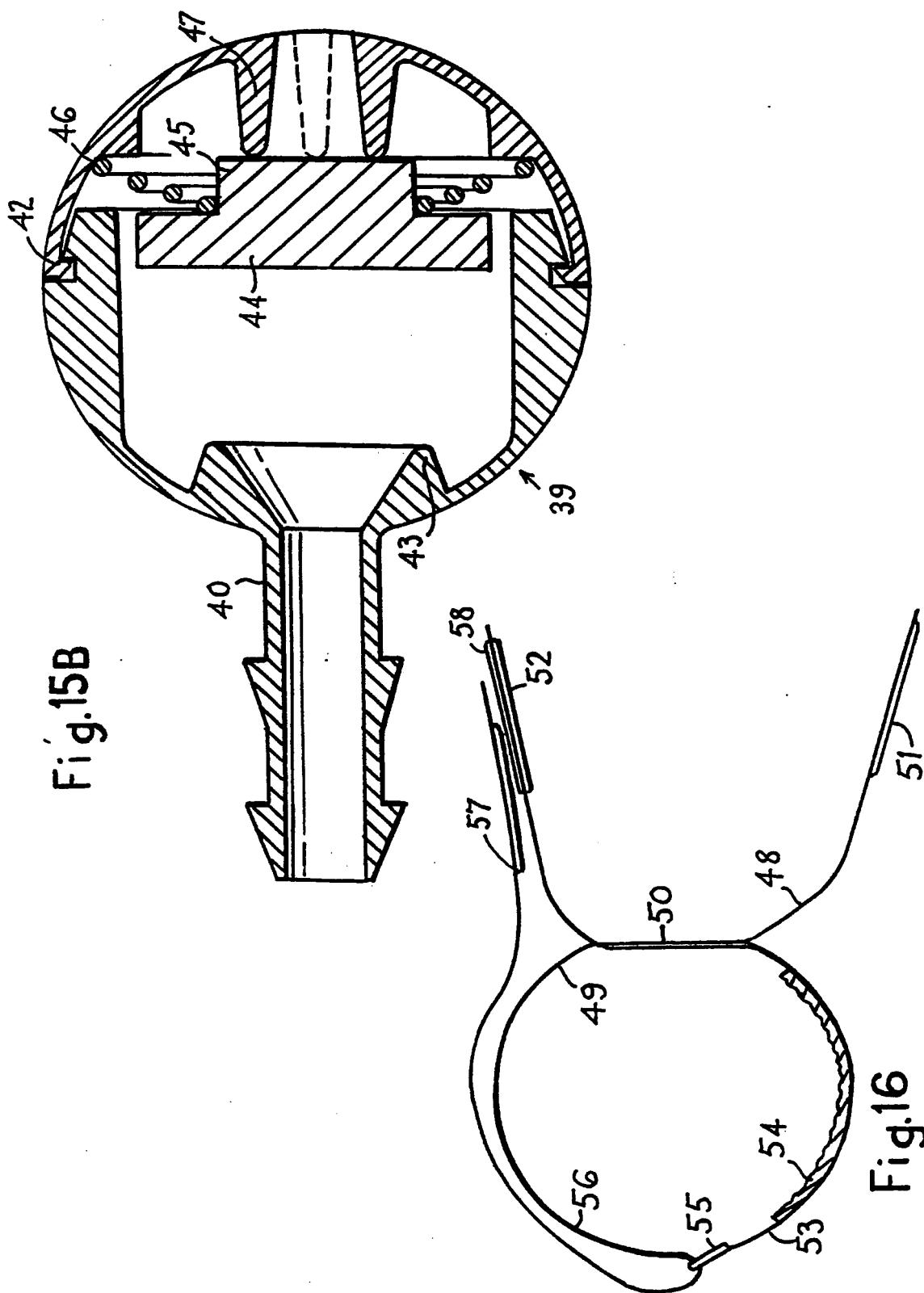


Fig. 15A

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European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 87 30 8693

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.4)		
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim			
X	US-A-2 969 064 (METZ) * Whole document *	1,2	A 47 G 21/18		
A	---	3,5,7-10	A 47 G 19/22		
X	US-A-3 165 241 (CURRY) * Figures 2-8; column 2, line 68 - column 3, line 71 *	1,2,10			
A	---	3,4,7,8			
X	CA-A- 37 027 (TICHY)(1971) * Whole document *	1-3,5,11			
A	---	4,6,8			
A	US-A-3 346 009 (LINDEBOOM) * Figures 3-5 *	6			
A	---				
A	DE-U-7 832 981 (HAUGK) * Abstract *	1-4,10,11			
A,D	US-A-4 196 747 (QUIGLEY et al.) -----		TECHNICAL FIELDS SEARCHED (Int. Cl.4)		
			A 47 G F 16 K A 61 J		
The present search report has been drawn up for all claims					
Place of search	Date of completion of the search	Examiner			
THE HAGUE	22-01-1988	BEUGELING G.L.H.			
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